

SIR JOHN CRAWFORD MEMORIAL ADDRESS 2023

Food and nutrition security: the climate, food systems, agroforestry and forestry nexus

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Good evening, everyone. It is my great pleasure to join all of you this evening and present the Sir John Crawford Memorial Address on food and nutrition security: the climate, food systems, agroforestry and forestry nexus. I want to thank the Crawford Fund for inviting me to speak on these critically important topics, so very close to my heart.

As we navigate what it takes to stay within three degrees Celsius to avoid climate tipping point, we also face immense food security and nutritional challenges. According to the *State of Food Security and Nutrition in the World 2023* report (FAO 2023), an additional 122 million people have been pushed into hunger since 2019. Of the 2.4 billion people facing the lack of constant access to food, around 900 million individuals faced severe food insecurity in 2022. Moreover, access to healthy diets has deteriorated since the global pandemic, with 3.1 billion people unable to afford a nutritious diet in 2021, an increase of 134 million people compared to 2019.

We all know the challenges humanity is facing. However, we also have access to decades of action research and development data that show solutions to problems, and opportunities to reimagine the way we interact with nature. And we can do it through global cooperation, knowledge-sharing and a commitment to building a better world – one that respects nature and one where people can live healthy lives and with enough nutritious food.

Trees and forest landscapes play a critical role in this; without them, a food-secure nutritious future is impossible. Warren Buffett once said: ‘Someone is sitting in the shade today because someone planted a tree a long time ago’. Some of the work we do today may take a long time to bear fruit, but a lot of it can have an almost immediate impact on well-being and food and nutritional security.



I am told I'm the first person representing forestry and agroforestry to be delivering this address, and so I look forward to sharing what forestry and agroforestry have to do with climate and food systems, and it's an immense honour for me to be here to do that. Over the past four months, since I joined CIFOR-ICRAF, I have experienced a number of firsts, including becoming the first African woman CEO of a CGIAR Center. These firsts are both a great privilege and a great responsibility, and one that I'm delighted and eager to take on, and as such it feels very fitting that you welcome me here this evening to speak on food and nutrition security. But my trajectory was not meant to bring me here today.

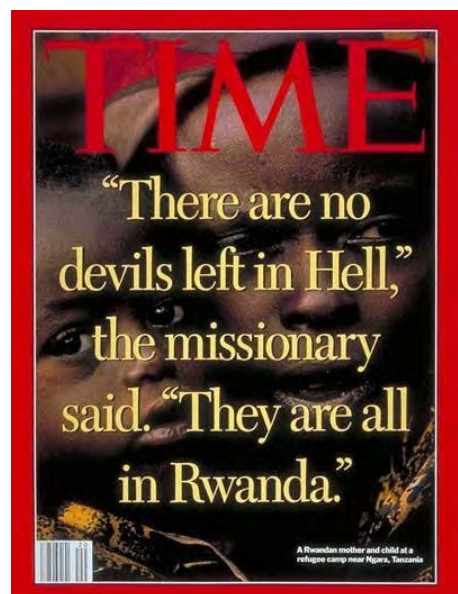
Now, as I mention the challenges that CIFOR-ICRAF is working to solve, I will take the opportunity to introduce myself through these challenges. As also for many of you, these challenges have touched my personal life. They have influenced what I have studied in university, the direction of my life and the decisions I make. They are challenges that I hope my own child and other children will not be left to grapple with once they take over leadership from us.

I was born in Rwanda in the seventies, and I am privileged to have poignant memories of a childhood connected to the Earth and of the lessons I learned from my mother about how to take care of the Earth. When I embarked on my journey from Kigali to Montreal in August 1989 at the age of 17, I expected to be back three years later from McGill University with my bachelor's degree in general agriculture in hand, to work with smallholder farmers. But life had different plans. I started university with a desire to be on the cutting edge of what's possible and to use these scientific tools to improve lives, particularly the lives of the most vulnerable to food security and malnutrition in Africa. But I didn't expect that the arc of my life would take me on an unexpected journey, and that it would take me 34 years to get back to the continent to settle.

When Rwanda initially went through a civil war, I went home as a 19-year-old intern to work on improving local forages. But what should have been a summer of immersion in research and action was also a summer of getting authorisation passes from field site to field site, going through checkpoints manned by our military. When this escalated in the 1994 genocide against the Tutsis in April 1994, I was 22 years old. At that point, I was writing my Master's thesis on mapping genes resistant to plant viruses.

While my homeland was aflame, *Time* magazine had this on its cover: 'There are no devils left in Hell ...They are all in Rwanda'. This is a memory I will hold in my heart forever. Somewhere between 800,000 and a million people were slaughtered in 100 days. Many were slaughtered with machetes that should have been meant for agricultural use.

But many people don't know that as a result of this terrible time in Rwanda, and since then in its aftermath, many forested lands were lost. Rwanda's Gishwati Natural Forest, which was about 100,000 hectares, lost 99% of its cover, the result of subsistence harvesting and cultivation by refugees in the aftermath. This brings me to the challenges that CIFOR-ICRAF is solving.



Challenge: Safeguarding biodiversity

Here are some grim statistics: over 50% of the world's tropical forests have been destroyed. On average, 137 species are driven to extinction in tropical rainforests every day; and more than a quarter of the threatened species are threatened with extinction.

But there is good news: there's an incredible amount of work on the ground right now to counter this threat. Prior to joining CIFOR-ICRAF I was on the executive board of the Global Crop Diversity Trust, and was lucky enough to work with the Honourable Tim Fischer, former Deputy Prime Minister of Australia. The Crop Trust provides funding to key seedbanks and genebanks around the world, including the CIFOR-ICRAF tree genebank in Nairobi, so they can safeguard the seeds and share them with farmers, researchers and plant breeders globally. I was already familiar with the importance of genebanks before joining CIFOR-ICRAF and the Crop Trust. In fact, I saw first-hand how important they are after the genocide that happened in Rwanda.



As a continent, Africa holds 26% of the biodiversity on the planet. We hold immense potential in terms of carbon sequestration and bringing back biodiversity. But unless the biodiversity is safeguarded, it can too easily be lost. During the 100 days of the genocide against the Tutsis, I didn't know if most of the people I loved in Rwanda were alive. I was writing my thesis, so the contrast between what was happening in my motherland and what I was doing as a student in Canada was huge; it was very difficult to reconcile.



In the years since, I have met some of the people who worked with bean genebanks. Beans are really critical to the Rwandan economy and our traditional diets, and when the genocide happened, people weren't able to harvest their crops, and so the crops withered in the fields and farmers couldn't collect seeds from them to plant and harvest the next year. When the economy restarted, we needed to replenish the stocks of beans in

the country – and because there were genebanks around the world that held copies of the genetic diversity of beans from Rwanda, we were able to restart.

People don't understand the relationship between genebanks and what needs to happen when we have conflict or other terrible situations in the world and need to restart economies or restoration. It's important to understand that genebanks are very crucial for keeping hope alive, especially for our food systems and bringing back nature after major crises.

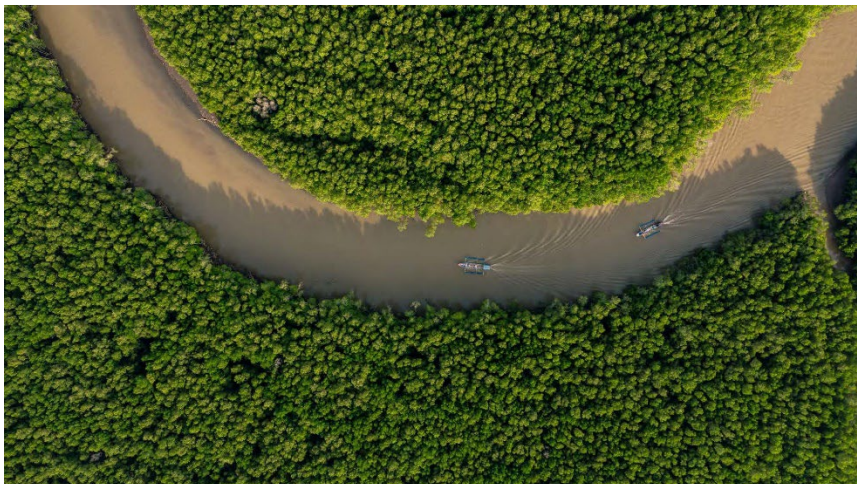


At CIFOR-ICRAF we are home to one of the largest tropical tree seed collections in the world: 190 tree species represented; 7000 seed samples and accessions conserved; three decades of scientific and on-the-ground expertise; 30 countries represented in where these genebanks are; 1800 smallholder farm-households supported to access food-tree species; and 6000 farmers trained in food-tree cultivation and use. And beyond safeguarding these seeds and making them available for use, we also use our expertise to help ensure that we grow the right tree at the right time for the right place, so that the seedlings can thrive with purpose.

Leading an organisation that not only helps safeguard the brilliant tree diversity around us, but also shares materials with farmers, breeders and researchers and supports work to adapt trees to the changing climate, pest disease and other challenges, is a way of making sure my daughter – and my daughter's children – will never need to be left with an Earth that's barren of biodiversity and life. That brings me to our second challenge.

Challenge: Solving climate change

CIFOR-ICRAF is committed to solving climate change. A question we are confronted with daily is how do we live within our planetary boundaries? How do we build interconnectedness? Right now, many of us are confronted with vicious cycles where poor practices or situations result in greater environmental damage, which exacerbates existing problems. In fact, the volatile challenges we face negatively impact one another. But with key changes we can move these vicious cycles into virtuous ones, creating small or big changes that positively influence one another to create new, positive and 'green' ways of thinking and doing things.



I recall that in my childhood I spent a lot of time in the countryside with smallholder farmers, enjoying the beauty of our forests, and I remember how green everything was, how lush it was, and how little dust was in the air. Decades later, the same areas have seen genocide, deforestation, soil degradation. But there is hope in Rwanda, because to bring back biodiversity and to focus on green growth are priorities for the country. I feel very lucky to have contributed to this new history for Rwanda as a member of the Presidential Advisory Council, which also includes two amazing Australians – Michael Roux and Doug Shears – both of whom are deeply committed to being outstanding global citizens.

As you probably know, global temperatures are expected to rise three degrees by the end of the century, and I'm sure it's no surprise to anyone that trees play a critical role in avoiding catastrophic climate change. Trees are a source of food and shade; they conserve water, give us oxygen and clean air, support soil health and support wildlife. Sustainable land management – including agroforestry, ecosystem conservation and restoration – and a transition to sustainable economic models are key for this.

All CIFOR-ICRAF research contributes to climate-change mitigation and adaptation by helping to keep trees in the ground, increasing tree cover and finding the best trees for local conditions. We have also done ground-breaking and award-winning research on wetlands. In 2017, our research



using the Global Wetlands Map (<https://www2.cifor.org/global-wetlands/>) revealed that there is three times more peat worldwide than previously thought. And prior to this, there was the pivotal 2011 discovery that mangroves store 3 to 5 times more carbon than other tropical forests, most of it in the soil (Donato *et al.* 2011). No-one really realises just how critical they are in our fight against climate change. Through this research, we are able to galvanise greater protection for wetlands, working together with partners, especially in Indonesia. It is important research like this that both reveals and quantifies the value of our Earth's resources, that helps inspire protection – and our scientists are at the forefront of it.

I should also mention our research on carbon markets. When I started looking at carbon markets in the early 2000s, Africa only had 5% of that market. I thought that to grow Africa's sustainability, and to build prosperity there had to be 'green growth' – that is, paths of economic growth that are environmentally sustainable – and so I knew we would have to focus on climate funding. Today we're in a much different space around nature and finance. We had a very successful COP15 in Montreal in 2022, where I had the opportunity to participate with the largest private-sector presence ever for a biodiversity COP, and so this is work I see expanding. I envision a world where the private sector takes a greater role in climate-change mitigation, and reduces their own impact. Work at CIFOR-ICRAF supports them to do this.



Challenge: Food security

Perhaps most important for those at this Crawford Fund conference is our work explicitly around food security, although I would argue that everything we do, as I've outlined so far, has an impact on this. As I mentioned before, I became acutely aware of the importance of ensuring we safeguard our food security through international collaboration and genebanks during the Rwandan civil war. Safeguarding and sharing seeds is one piece of the puzzle. Whether restoring degraded forests, or re-establishing local crop seed systems, no conversation about food security can be had without discussions about trees. For food and nutrition security in the context of agroforestry and forestry, no other organisation has as holistic an approach as CIFOR-ICRAF.

For my part, I began my academic career at 17 at McGill, and during my undergraduate studies when I went home, and during my internship, it was really difficult to think that one day I'd be able to come back to Africa and work with smallholder farmers. So, I decided to take on a PhD, and I studied molecular genetics because I was interested in the cutting edge of innovation. Working at

that interface of genetics, of discoveries that were going to change how we relate to DNA, for me was an alternative path to what I really longed for – which was to be working at the forefront of food security globally. When I finished my PhD I joined a biotechnology company in molecular diagnostics and worked on how to use DNA to look at food industry safety: on whether there are microbial contaminants for food, environmental contaminants; in some cases, we even worked on bioterrorism. These early beginnings allowed me to do work that I now see was crucial to me becoming the woman and the scientist I am today.



One of the areas that I think is absolutely critical is how we are looking after our soil, the Earth's skin. The health of our soil determines the health of our food systems, which will determine the health of our global populations.

In Africa, 65% of the soils are degraded, as are a third of soils around the world. Healthy soils are a foundation for functioning ecosystems, including sustainable agricultural systems. Our Nairobi campus of ICRAF is home to a state-of-the-art soil spectroscopy lab (the ICRAF GeoScience Laboratory) and the global database of ecosystem health indicators – one of the world's best tools for large-scale and accurate soil analytics. By assessing land and soil health, we can provide analysis at farm, landscape and global levels and beyond.

We also look at trees and look at how they are dependent on the quality of soil, in order to solve hunger. We are currently working with partners in India on trees outside forests, in a five-year initiative funded by the United States Agency for International Development (USAID) and India's Union Ministry of Environment, Forest and Climate Change. The initiative looks at expanding the areas that are cultivated under trees outside forests. The greatest opportunities in the world for growing trees are actually on-farm.

One of the things we see as critical in this project in India, which is a US\$25 million project, is the possibility of strengthening the enabling environment: to improve laws, regulations, policy, certification and standards, to scale-up trees outside forests. We see this as a way to increase access to finance, insurance and good-quality planting material, to provide incentives and value-chain support to boost the demand for products from trees outside farms. We also see this as a way to bridge the gaps in technical and market information through extension service, knowledge, data, monitoring and decision systems.

When I see the work that we're doing in India in this case, I am reminded of my own home of Rwanda and how planting the right tree in the right place for the right purpose can have such an immense impact in a relatively short amount of time, especially when planted on farms. And I am reminded, as well, of how dry dusty air can be transformed by a greener environment when there's fruit, when there's fertile soil, and when smallholder farmers can have rich harvests of the traditional foods often neglected but so important for local nutrition and food security.

CIFOR-ICRAF achievements

In fact, the topics we care so deeply about this evening are ones that CIFOR-ICRAF has been committed to solving for the past 40-plus years: safeguarding biodiversity, stabilising the climate, transforming food systems and value chains, and ensuring equity in everything we do. These challenges interact with one another, and what we know now is that, fortunately, there are solutions which many of you here today are either championing or funding or researching. At CIFOR-ICRAF that's exactly what happens every day. We have been at the forefront of combining rigorous science with an action-focused mission, building capacity, influencing global policy and transforming ecosystems.

Today, CIFOR-ICRAF stands as one of the best examples of what is possible. I'm invigorated to lead CIFOR-ICRAF to harness what we have learned over decades of work and to rise to the moment in this particular moment in human history, and use our collective passion, creativity and intellect to build a better Earth.

At CIFOR-ICRAF what we do is ground-breaking research around trees, forests and agroforestry, and landscapes. We have used our research to improve the lives of people and influence policy globally, and fortunately we are implementing these solutions in partnership, and many of you today here are partners whom we work with happily, and look forward to doing even more with in the future.

CIFOR has been around for 30 years headquartered in Indonesia, and ICRAF for 45 years headquartered in Nairobi, with offices in many countries in Asia, Africa and Latin America. We are now a unified organisation, where seeds of trees stored in a world-class genebank allow research on forests and communities and biodiversity. We bring together the expertise of scientists from around the world, communication experts and fund raisers, to develop innovative solutions to scale-up investment in sustainable development and address the global challenges of our time. My journey has interfaced biodiversity, health, gender, agriculture and research, and I am so proud of the work we're doing today.

Examples

One example of the work we're doing is the Yangambi 'engagement landscape' in the Democratic Republic of Congo (DRC). DRC is fortunate to have a wealth of natural resources. It's home to rich tropical forests that are as important to the planet as are the forests of Indonesia and the Amazon. Nevertheless, the economic value of these resources hasn't reached most citizens of DRC.

Our work in Yangambi is an example of what we can do when we work with local communities to support resource management. More than 200,000 people live in this landscape. They rely on natural resources for their livelihoods, including logging, slash and burn agriculture, hunting and fishing. And the region's value chains primarily serve the city of Kisangani, a thriving market of about 2 million urban dwellers.



Unfortunately, as you know, when income-generating activities are limited, and the local population often has no other alternative than overexploitation, this can turn into a vicious cycle of destruction. Change in such a complex environment requires long-term work. Fortunately, CIFOR-ICRAF has been working in Yangambi for 15 years with a wide range of interventions in single landscapes, because the opposite of poverty isn't wealth; the opposite of poverty is actually *opportunity*.

Our objective is to help create opportunity in DRC. To do this, we support entrepreneurship, innovation, research and management of natural resources, leading to the transformation of the Yangambi landscape into a place where forests contribute to the stable well-being of local communities. We focus on five main activities: capacity improvements; support for local entrepreneurship; biodiversity protection; research for development; and awareness raising; and we are achieving remarkable results, turning a vicious cycle into a virtuous circle.

By involving local communities in conservation scientific activities, they can improve their living conditions for a green future. Since 2019, our work has led to 2 million trees being planted and 2300 hectares of land being restored. It has also created more than 3400 seasonal and direct jobs. This is just one example of the work that CIFOR-ICRAF's amazing staff are involved in.



Another very important example is the work we are doing supporting communication around the world. The Global Landscape Forum (GLF) is a powerful tool that reaches millions of people around

the world and has chapters of young people who are champions of restoration and that are able to connect via a network and collectively support each other in their initiatives.

Another example of our work is in Cote d'Ivoire, which is one of the world's leading producers of cacao. In that country, 800,000 smallholders produce about 40% of the world's supply of cocoa, but those farmers get only about 4% of the value that consumers pay for chocolate every year. Our work there, and everywhere, aims to ensure greater benefits to these farmers and other smallholders that feed 75% of the population on the planet.

The work we do, whether it's soil analysis, whether it's partnering with indigenous peoples around the world, whether it's looking at how we can serve forests around the world, whether it's via capacity I have with others to influence policy such as on the Presidential Advisory Council of Rwanda, is all pursuing the legacy of Wangari Maathai, Nobel Peace Prize Laureate for 2004, who led a non-government movement promoting environmental conservation and tree planting, among other things. She is my hero, and I had the opportunity of meeting her after she got her Nobel laureate. Wangari Maathai said: 'It's the little things citizens do that make the difference'. My 'little thing' is planting trees. I have the honour now of working with her daughter, Wanjira.

I think it is amazing to know that we can work, generation to generation, and build on the wisdom, the resilience and the vision of the ancestors that came before us, to build a future that we hope will be better, so that future generations know we've done all we could so that they have a better chance on this planet, in harmony with nature, than we currently have.

References

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Éliane Ubalijoro, PhD, is Chief Executive Officer of the Center for International Forestry Research and World Agroforestry (CIFOR-ICRAF) and Director General of ICRAF. An accomplished leader with a background in agriculture and molecular genetics, she serves on several boards and has been recognised for outstanding contributions in the areas of innovation, gender equity, and sustainable prosperity creation. Dr Ubalijoro has been a professor of practice for public–private sector partnerships at McGill University since 2008, with research interests focusing on innovation, gender and sustainable development for prosperity creation. From 2021 to March 2023, she was the Executive Director of Sustainability in the Digital Age and the Canada Hub Director for Future Earth. She is a member of Rwanda's National Science and Technology Council and Presidential Advisory Council, the Impact Advisory Board of the [Global Alliance for a Sustainable Planet](#), the Science for Africa Foundation, and the Capitals Coalition Supervisory Board, among others. She is a fellow of the International Science Council. Recognised for her work in leadership and gender equity, Dr Ubalijoro is a recipient of the International Leadership Association's 2022 awards in women and leadership for outstanding practice with broad impact, and is part of a cohort of appointed International Science Council fellows in recognition for outstanding contributions to promoting science as a global public good. She has facilitated the UNAIDS Leadership Programme for Women at the United Nations System Staff College. Dr Ubalijoro was a member of FemStep, a research network highlighting rural girls' and women's perspectives for engendering poverty reduction strategies in Rwanda, South Africa, Tanzania, DR Congo and Ethiopia using arts-based methodologies. Her career path was featured in Forbes in celebration of International Women's Day 2019.